ENTOMOLOGICAL NOTES

Bombycine Moths.—The National Academy of Sciences (1914) has recently published, as First Memoir of Volume XII, Part III of the "Monograph of the Bombycine Moths of North America", by A. S. Packard. The manuscript, left unfinished at the death of the author, was edited by Prof. T. D. A. Cockerell, assisted by a number of other workers. This part of the Monograph includes the families *Ceratocampidæ* (exclusive of *Ceratocampinæ*) *Saturniidæ*, *Hemileucidæ* and *Brahmæidæ*. This large volume contains a systematic discussion of each of the North American species and important data are given for immature stages. Tables for the separation of genera and species are included. One hundred thirteen plates accompany the text matter, of which thirty-four are wholly or in part in color, representing primarily the larval stages of many species. Students of *Lepidopera* will find this work of great interest.

Air Stores of Aquatic Insects.—Ege ('15, Zeit. f. Allgemeine Physiol., 17:81-124) has investigated the respiratory function of the air stores carried by *Corixidæ, Dystiscidæ,* and *Notonectidæ*. These air stores are found to have two distinct functions: (1) They have a hydrostatic function, thus playing a very important rôle in connection with the equilibrium of the animal and its relation to the surface of the water. (2) They are of respiratory importance and related to respiration in two ways: (a) they function in ventilating the tracheal system when the animal is submerged, and (b) they constitute a mechanism by means of which the insect is able to utilize the dissolved oxygen of the water.

Trichopterous Larvæ.—Krafka (15, Can. Ent., 47: 217-225) has made a study of trichopterous larvæ and presents a key to the families which will, no doubt, prove of great service in the identification of the immature forms. The key also leads to the identification of some of the principal subfamilies. Thirty-seven figures of structural detail of larvæ are included in the paper.

Germ Cells in Hymenoptera.—Hegner ('15, Journ. Morph., 26: 495-535) reports the results of studies on the protoplasmic differentiation in the oocytes of some of the *Hymenoptera*. The ovariole of *Apis mellifica* has four regions: terminal filament, rosette

region, differentiation zone, and posterior linear series of oocytes separated by nurse cells. Each rosette group arises from a single oogonium and the component cells are held together by persistent spindle fibers from preceding mitoses. Oocytes and nurse cells arise from oogonia, the descendants of which can be determined by the presence of certain deeply staining rings between the cells. Granules, apparently mitochondrial in nature, appear near the nuclei of oocytes, later becoming distributed throughout the egg cytoplasm. In *Camponotus herculeanus* var. *pennsylvanica,* each ovariole consists of a terminal filament, terminal chamber, growth zone devoid of "bacteria-like rods" and posterior, linear series of oocytes accompanied by nurse cells, the former being surrounded and subsequently invaded by the bacteria-like bodies. Secondary nuclei, the origin and fate of which are in doubt, appear near the oocyte nucleus, increase in number, ultimately surround the germinal vesicle, and finally become distributed throughout the oocyte, particularly in the vicinity of the follicular epithelium. In *Copidosoma gelechiæ, Apanteles glomeratus,* and *Andricus punctatus* the changes in the oocyte nuclei are very similar, consisting essentially of early chromosome formation, paired fusion of chromosomes, arrangement on an asterless spindle, and condensation. The oocytes of *Diastrophus nebulosus* contain a chromatin body which probably results from chromosome condensation. In certain growth stages of *Rhodites ignota* large numbers of secondary nuclei appear, originating, apparently, from certain peripheral granules which stain like chromatin.

New Order of Insects.—Crampton ('15, Ent. News, 26: 337-350) has studied the morphology and systematic position of the remarkable annectent form, *Grylloblatta campodeiformis,* which was recently described by Walker from specimens found in Canada and placed by him in a new orthopteran family, *Grylloblattidæ.* Crampton finds that the structural features of this species include a combination of characters found in *Dermaptera, Isoptera* and *Gryllidæ* and that there are sufficient grounds for considering *Grylloblattidæ* a distinct order, the *Notoptera.* This new order occupies a position intermediate between the *Dermaptera* and *Isoptera* and seems to

include the "nearest living representatives of the common ancestors of the Gryllidæ and 'Locustidæ' (Tettigonidæ)."

Luminous organs.—Wheeler and Williams ('15, Psyche, 22: 36-43) find that in the New Zealand glow-worm, *Bolitophila luminosa,* the four elongated Malpighian tubules, which extend to the posterior region of the body, are differentiated into two parts: (1) the long, proximal portions, which retain the primitive excretory function of these organs; (2) the short, distal, dilated tips, closely applied to the intestine, which appear as four curved, luminous rods in the living larva and constitute the photogenetic organ. Distinct structural differences occur in the two differentiated parts. In no other insect are the Malpighian tubules known to have a photogenetic function, although they sometimes acquire functions other than that of excretion, as for example, the production of silk in certain *Neuroptera* and *Coleoptera.*

Wilt Disease.—Glaser ('15, Journ. Agr. Research, 4: 101-128) finds that the wilt of gypsy-moth caterpillars is a true infectious disease which occurs all over the gypsy-moth territory. Epidemics occur only in regions heavily infested with gypsy-moth and climatic conditions appear to have an important relation to the disease in the field. Certain imported parasites may be important factors in the distribution of the wilt. There is no direct evidence that the disease is transmitted from one generation to another. Infection naturally occurs through the mouth by means of the food. The disease is more prevalent among the older larvæ.

Olfactory Sense in Coleoptera.—McIndoo ('15, Biol. Bull., 28: 407-460) reports the results of an extended morphological and experimental study of olfaction in beetles. His results show that the antennæ do not bear any of the olfactory organs but certain pores, found on the peduncles of the elytra, on the dorsal surfaces of the wings, on the trochanters, tibiæ, sometimes on the femora and tarsi, and perhaps on the mouth appendages, are the true olfactory organs.

Sex recognition.—Sturtevant ('15, Journ. Animal Behavior, 5: 351-366) finds that, in *Drosophila,* the olfactory and tactile senses are probably concerned with sex recognition and that sight is not essential. The wings of the male function in the production of sexual excitement in the female. The characters of certain mu-

tants—white eyes, vermilion eyes, yellow body color, and curved wings—seem to have no selective value. Evidence is presented in support of the view that neither sex exercises any "choice" in the selection of a mate but mating will occur when members of the two sexes, ready to mate, chance to find each other.

Notonectidæ.—Essenberg ('15, Journ. Animal Behavior, 5: 381-390) reports results of a study on the natural history and habits of *Notonectidæ*. The food is chiefly living or dead insects, and animals many times larger may be successfully attacked. Chemicals in solution have very little influence on backswimmers. They have a strong, positive phototaxis which increases with rise of temperature and with greater light intensity. They are positively rheotactic. The young resemble the adults in their behavior and instincts.

Habits of Water-striders.—Essenberg ('15, Journ. Animal Behavior, 5: 397-402) finds that *Gerris remiges* is positively thigmotactic, positively phototactic, positively rheotactic, and negatively geotactic. Sense of smell is apparently present; hearing is not well developed; and sight is very keen and efficient. No special choice is shown in the selection of food, any dead or living animal matter being consumed. Individuals may live for weeks or months without food. They are actively predaceous but never attack animals below the surface of the water. They possess the cleaning habit and may be engaged in this activity for considerable periods of time. Death feigning is common and may be produced by artificial stimulation.

Middle Membrane in Wings.—Marshall ('15, Annals Ent. Soc. Am. 8:201-216) finds that in *Platyphylax designatus (Trichoptera)* the structure, usually known as the middle membrane, is not a true membrane but is a thin layer of protoplasm which occupies a median position within the wing. During the development of the wing this median layer is not continuous but disappears and is reformed in the same position. The resulting layer is more membrane like than the one first formed.

Preservative for Insects.—Schulze, ['15, Entomological News, 26: 361 (abstract from Deut. ent Zeitschr., 1915, p. 204)] recom-

mends the following fluid for the preservation of galls, coccids on plants, and larvæ for dissection: 200 cc. glycerine, 200 cc. distilled water, 1 gram crystallized carbolic acid.

This mixture is said to be serviceable for preservation in the tropics.

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NOTES ON OLIGOCHÆTA

Hæmonais.—Stephenson ('15, Trans. Roy. Soc. Edinburgh, 50:769-781) reports the discovery of a new species of *Hæmonais* in India. Heretofore, this genus was represented only by a single species from Switzerland. A complete account of the anatomy is given. In the sexually mature condition, the alimentary canal undergoes atrophy. The mouth remains but the lumen of the canal becomes indistinct and disappears in V, reappearing only posterior to XI. The posterior region is nearly normal in appearance but, in the zone of degeneration, the canal is merely band-like and its transverse dimensions are less than those of the ventral nerve cord.

Dero and Slavina.—Stephenson ('15, Trans. Roy. Soc. Edinburgh, 50:789-795) describes the anatomy of sexual individuals of *Dero limosa* and finds, in these animals, a curious degeneration of the digestive tract which has not been described in the Oligochæta except for *Hæmonais,* although a similar condition is known to occur in certain Polychæta. The anterior opening disappears, and the mouth cavity, pharynx, œsophagus, and intestine become so profoundly changed that they are represented only by a narrow cord for some distance. The lumen is absent anterior to XII. Apparently, the development of sexuality marks the end of the life of the individual. In this same paper, the hitherto unknown sexual organs of *Slavina* are described in the species *punjabensis.*

Bifurcation in Lumbricus.—Benham ('15, Trans. New Zealand Inst., 47:185-188) reports an interesting case of bifurcation in *Lumbricus rubellus.* The right side of the third clitellar somite gives rise to a posteriorly directed branch, about one-fifth as long as the body and containing fifteen somites. The clitellum is continued on the three basal somites of the branch and the tubercula pubertatis is continued along their outer side. The nerve cord and